DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention incorporates binary picture data and relates to image-operations equipment which performs image-operations processing of rotation, variable power, etc. to this binary picture data, and a method for the same.
[0002]
[Description of the Prior Art]In the equipment which performs image-operations processing of rotation, variable power, etc. to image data conventionally, The bit image which incorporated the image data which serves as a processing object from external memory storage, stored this image data in the memory as data of bit image form, and was stored in this memory is read, and image-operations processing is performed to this bit image by making each raster line of opposite Perilla frutescens (L.) Britton var. crispa (Thunb.) Decne. into a batch.
[0003]
[Problem to be solved by the invention]However, since it stores in a memory in the conventional equipment mentioned above by making the image data used as a processing object into a bit image, While the required memory space for storing each of the raster line in which each monochrome color is intermingled, and a raster line taken over by whites, such as unfilled space, becomes the same, Make each raster line of opposite Perilla frutescens (L.) Britton var. crispa (Thunb.) Decne. into a batch at this bit image, and Rotation, Since image-operations processing of variable power etc. is performed, while it is necessary to process a raster line taken over by whites, such as unfilled space, like other raster lines and memory quantity required for storing of a bit image increases in the case of this image-operations processing, a throughput increases.
[0004]Since the amount of bit image data to image data increases by the order of a square according to this resolution becoming high when dealing with an identical image with high resolution, While memory quantity required for storing of this bit image increases with increase of this amount of bit image data, a throughput increases.
[0005]When dealing with image data as a bit pattern, in image-operations processing of expansion, reduction, rotation, etc., the data movement of bitwise is needed, but. In general-purpose CPU, since data movement between a memory and a register is performed per byte, if described image operation processing is performed using this general-purpose CPU, it is necessary to perform complicated bit test / bit mask, great load will be applied to this image-operations processing, and processing speed will become very slow by extension.
[0006]There is in providing the image-operations equipment and the image-operations method of attaining improvement in the speed of image-operations processing while being able to reduce the storing capacity which storing of this binary picture data takes, when the purpose of this invention incorporating the binary picture data used as an image-operations object.
[0007]

[Means for solving problem]In the image-operations equipment which the invention according to claim 1 incorporates binary picture data, and performs image-operations processing of rotation, variable power, etc. to this binary picture data, The data conversion means changed into the color change point data in which the position of a color change point [in / for the incorporated above-mentioned binary picture data / each of that raster line] is shown, the storing means which stores the aforementioned color change point data is established, color change point data is read from the aforementioned storing means, and the aforementioned image-operations processing is performed to this color change point data that carried out reading appearance

[0008]The invention according to claim 2 established the data format conversion means which changes into the data according to the data format of the output destination change the color change point data processed by the aforementioned image-operations processing in the image-operations equipment according to claim 1.

[0009]The invention according to claim 3 incorporates binary picture data, and this invention is characterized by that an image-operations method of performing image-operations processing of rotation, variable power, etc. to this binary picture data comprises the following.

A process changed into color change point data in which a position of a color change point [in / for incorporated above-mentioned binary picture data / each of that raster line] is shown.

A process of storing the aforementioned color change point data in a storing means.

a process of reading color change point data from the aforementioned storing means, and performing the aforementioned image-operations processing to this color change point data that carried out reading appearance.

[0010]The invention according to claim 4 includes the process of changing into the data according to the data format of the output destination change the color change point data processed by the aforementioned image-operations processing, in the image-operations method according to claim 3.

[0011]

[Mode for carrying out the invention]It explains referring to a figure for an embodiment of the invention below.

[0012](The 1st form of enforcement) The block diagram and drawing 2 which drawing 1 shows the composition of one form of enforcement of the image-operations equipment of this invention are a figure showing the example of conversion from the binary picture in the image-operations equipment of drawing 1 to color change point data.

[0013]The secondary memory 3 which has the color change point information storing part 3b which stores the bit image storage 3a and the color change point data mentioned later which hold the binary picture data used as a processing object as image-operations equipment is shown in drawing 1, having the data conversion means 1, the data conversion means 1 incorporates binary picture data from the bit image storage 3a, and is this ******** -- it changes into the color change point data in which the position of a color change point [in / for binary picture data / each of that raster line] is shown. For example, as shown in drawing 2 (a), 32 dots wide and 32-dot-long secondary image data are held at the bit image part storage 3a, and this secondary image data is changed into the color change point data in which the position of the color change point in every raster line is shown. the color on a raster line -- the black from white -- or while being specified that the position which changes from black to white is a change point as shown in drawing 2 (b), it is specified that the position at the tail end of a raster line is a change point, and the position of this change point is shown by color change point data. It is specified in the head position of each raster line with a white block being located as the thing.

[0014]The color change point data changed from binary picture data by the data conversion means 1 is stored in the color change point information storing part 3b. The color change point data stored in the color change point information storing part 3b is read by the image processing means 2, and the image processing means 2 performs image-operations processing of rotation, variable power

(expansion, reduction), etc. to the read color change point data.

[0015]Once the color change point data in which image-operations processing was performed is stored in the color change point information storing part 3b, it is given to the output-data-form conversion method 4. The output-data-form conversion method 4 changes the color change point data in which image-operations processing was performed into the data of the data format which the output device 5 requires, and outputs it to the output device 5.

[0016]Next, it explains, referring to a figure for the reduction operation in image operations, enlarging operation, and rotatably operating in order.

[0017](Reduction operation 1/N time (N is a positive integer)) The figure in which drawing 3 shows the binary picture data before reduction and the binary picture data after reduction, the flow chart which shows reduction operation processing [in / in drawing 4 / the image-operations equipment of drawing 1], and drawing 5 are the figures showing the example of the contents of the reduction operation processing in the image-operations equipment of drawing 1. In this explanation, the case where it changes into the binary picture data which reduces the binary picture data shown in drawing 3 (a) by 1/3 time, and is shown in drawing 3 (b) is taken for an example.

[0018]The color change point data in which the position of the color change point in each raster line of binary picture data is shown in reduction operation of this embodiment, It is expressed with Locations [Height] using the parameter counter for managing the parameter Height for managing the number of a raster line, and the number of the positions of a color change point, and [counter], This Locations [Height] and [counter] show the dot position of what position is a position of a color change point from that head in a Height position raster line. For example, as shown in drawing 5 (a), the position of six color change points exists in a Height position raster line, Locations [Height] and [counter =0] show that the 7th dot position is a position of the color change point to black [white] from the head in a Height position raster line, Locations [Height] and [counter =1] show that the 9th dot position is a position of the color change point from black to white from the head in a Height position raster line. Since it is specified in the head position of each raster line with a white block being located as the thing as mentioned above, if Couter is even numbers, Locations [Height] and [counter] will show the head position of a white block, but. When a black block is temporarily located in the head position of a raster line, it is Locations [Height] and [0]. It is referred to as =0. Thus, binary picture data is changed into the color change point data denoted by Locations [Height] and [counter], and this color change point data is stored in the change-point-information storage 3b in the data format of Locations [Height] and [counter].

[0019]On the other hand, the position of the color change point in the data, i.e., the raster line after reduction operation processing, after the reduction operation processing to the color change point data shown by Locations [Height] and [counter], It is expressed with Result_Locations [Height] and [counter]. Result_Locations [Height] and [counter] show the dot position of what position is a position of a color change point from the head in a Height position raster line like Locations [Height] and [counter]. Thus, it is expressed with Result_Locations [Height] and [counter] by the color change point data after reduction operation processing, and this color change point data, It is stored in the change-point-information storage 3b in the data format of Result_Locations [Height] and [counter].

[0020]In this reduction operation, the reducing process to the direction of a raster line and the reducing process to the direction which intersects perpendicularly with a raster line are performed. When 1/3 time as many reduction is performed in the reducing process to the direction of a raster line to the color change point data shown by Locations [Height] and [counter], for example in a Height position raster line, The value of Locations [Height] and [counter] is divided by 3, the value is rounded off, and it stores in Result_Locations [Height] and [counter]. At the example shown in this drawing 5 (a), it is Locations [Height] and [0]. It is Result_Locations [Height] and [0] to =7. =2 is obtained, It is [as opposed to / Locations [Height] and [1] / =9] Result_Locations [Height] and [1]. =3 is obtained.

[0021]In the reducing process to the direction which intersects perpendicularly with a raster line, For example, when performing 1/3 time as many reduction, a raster image is divided into the unit block which consists of three continuous raster lines as shown in drawing 5 (b), 1/3 time as many reduction is performed in the direction which intersects perpendicularly with a raster line by using only the position of the color change point of the raster line which extracted the raster line of the head in each block, and extracted other two raster lines for every thinning and this block.
[0022]Next, it explains, referring to drawing 4 for the procedure of above-mentioned reduction operations of being 1/3 time many.
[0023]The parameter Height shown for Uchi's of the raster line's in a raster image raster line of what position it is in Step S1 at first, the step S2 which initializes and follows "0", ImageHeight which shows the total number (the total dot number to the direction which intersects perpendicularly with the raster line in a raster image) of the raster line in the parameter Height and a raster image is compared. If Height<ImageHeight is materialized, it will progress to Step S3, and this processing will be ended if Height<ImageHeight is not materialized.
[0024]In Step S3, counted value couter which calculates the dot number to the direction of a raster line by step S4 which initializes and follows "0." The value of Locations [Height] and [counter] is compared with Raster_SIZE which shows the total dot number to the direction of the raster line of a raster image.
[0025]If the relation of Locations[Height] [counter] <=Raster_SIZE is materialized, It progresses to Step S5 and the value which divided the value of Locations [Height] and [counter] by 3, and rounded off below the decimal point is assigned to Result_Locations [Height] and [counter]. Subsequently, it progresses to Step S6, the value of the parameter counter is incremented one time, and the processing from Step S2 is repeated again.
[0026]On the other hand, if the relation of Locations[Height] [counter] <=Raster_SIZE is not materialized, the reducing process to the direction of a raster line in a parameter Height position raster line will be completed, and it will progress to Step S7. In Step S7, the value of the parameter Height is incremented three times, 1/3 time as many reduction to the direction which intersects perpendicularly with a raster line by increment of this parameter Height is performed, and the processing from Step S2 is again repeated to the following parameter Height position. The reducing process to the direction of a raster line in a parameter Height position [following] raster line is performed.
[0027](Enlarging operation N times (N is a positive integer)) In this enlarging operation, expanding processing to the direction of a raster line and expanding processing to the direction which intersects perpendicularly with a raster line are performed. When N times as many expansions are performed in the expanding processing to the direction of a raster line, for example, In a Height position raster line, the value of Locations [Height] and [counter] is increased N times, and the value is stored in Result_Locations [Height] and [counter].
[0028]In the expanding processing to the direction which intersects perpendicularly with a raster line, N times as many expansions are performed in the direction which intersects perpendicularly with a raster line by storing the data of the same raster line succeeding [this / N] the case where N times as many expansions are performed, for example.
[0029](Variable-power-operation A by arbitrary magnification A/B and B are relatively prime positive integers) The flow chart and drawing 7 in which the variable-power-operation processing by arbitrary magnifications [in / in drawing 6 / the image-operations equipment of drawing 1] is shown are a figure showing the example of the contents of the variable-power-operation processing by the arbitrary magnifications in the image-operations equipment of drawing 1. In this explanation, the case where variable power of the binary picture data is carried out to A/B times shall be taken for an example, and the relation of A>B shall be materialized. That is, the case of the variable power operation of larger magnification than 1 is explained to an example.
[0030]While storing in the change-point-information storage 3b the color change point data in which

the position of the color change point in each raster line of binary picture data is shown in the data format of Locations [Height] and [counter] like reduction and enlarging operation in the variable power operation of this embodiment, The color change point data after variable-power-operation processing is stored in the change-point-information storage 3b in the data format of Result_Locations [Height] and [counter]. Array parameter Comb [e] used as the index of change of size in the direction which intersects perpendicularly with a raster line is used, and array parameter Comb [e] expresses with this variable power operation the arrangement which has B elements.
[0031]In this variable power operation, as shown in drawing 6, variable power processing (step S11-14) to the direction which intersects perpendicularly with a raster line is performed first, Then, for the variable power processing to the direction which variable power processing (Step S15) to the direction of a raster line is performed, and intersects perpendicularly with a raster line, The processing (step S11-13) which creates above-mentioned array parameter Comb [e], and the processing (Step S14) which carries out operation to a raster line using this array parameter Comb [e] are included.
[0032]In creation processing of this array parameter Comb [e], first, array parameter Comb [e] (the inside of drawing 6 -- [] -- inner e is omitting) which has B elements to the A/B twice as many variable power rate arbitrarily set up in Step S11 as this A storing region is secured and it asks for R not much with the quotient Q using the following (1) type at continuing Step S12.
[0033]
A=BQ+R -- (1)
However, Q and R are taken as a positive integer.
[0034]When this Q and R are called for, in Step S14, the value of Q and R for which it asked is stored in the element of array parameter Comb [e]. In storing to the element of array parameter Comb [e] of this Q for which it asked, and R, as shown in drawing 7 (a), the value of Q for which it asked is first stored in all the elements of array parameter Comb [e]. Subsequently, R elements which do not overlap out of each element of array parameter Comb [e] are chosen with a random number, and 1 is added to the value stored in these R selected elements.
[0035]Subsequently, it progresses to Step S13 and operation processing to the raster line using array parameter Comb [e] is performed. As shown in drawing 7 (b), specifically, it divides into two or more Brock who has first a raster line of B book which continues a raster image. For example, in the case of A/B=7/4, a raster image is divided into two or more Brock who has four continuous raster lines. Subsequently, as shown in drawing 7 (c), the raster line of B book and each B elements of array parameter Comb [e] which are included in it for every block are matched, Each raster line of B book is rewritten by a number equal to the value stored in the element of corresponding array parameter Comb [e] of raster lines, respectively. For example, when the value stored in the element of array parameter Comb [e] corresponding to one certain raster line is "2." The one raster line is rewritten by two raster lines, and when the value stored in the element of array parameter Comb [e] corresponding to other one raster line is "1", the one raster line is rewritten by one raster line. thus, Locations [Height] and [counter] (the inside of drawing 6 -- each -- [] -- inner) [Height and] counter is omitted -- **** -- a change of size in the direction which intersects perpendicularly with a raster line being made, and the processing result by rewriting a raster line to the data stored, it is stored in Result_Locations [Height] and [counter] (the inside of drawing 6 -- each -- [] -- inner Height and counter are omitted).
[0036]Subsequently, it progresses to Step S15 and variable power processing to the direction of a raster line is performed. The value which hung A/B on the value of Result_Locations [Height] and [counter] for every raster line, and rounded off below the decimal point is assigned to the variable power processing to this direction of a raster line at Result_Locations [Height] and [counter].
[0037]Although this embodiment explained the variable power operation of larger magnification than 1, In the variable power operation of magnification smaller than 1, for example, the variable power operation of magnification C/D (C<D), It divides into two or more blocks which have a raster line of

D book which continues a raster image, The line of C book is regularly extracted from the raster line of D book contained in it for every block, By storing in Result_Locations [Height] and [counter] the extracted data stored in the Locations [Height] and [counter] for every raster line. Change the size to the direction which intersects perpendicularly with a raster line, and variable power processing to the direction which intersects perpendicularly with a raster line by storing in Result_Locations [Height] and [counter] is performed, By assigning the value which hung C/D on the value of Result_Locations [Height] and [counter] for every raster line, and rounded off below the decimal point to Result_Locations [Height] and [counter]. Variable power processing to the direction of a raster line is performed, Thus, obtained Result_Locations [Height] and [counter] will show the processing result of the variable power operation of magnification smaller than 1.

[0038](Rotatably operating) The flow chart which shows rotatably operating processing [in / in drawing 8 and drawing 9 / the image-operations equipment of drawing 1], The figure and drawing 11 in which the example of the contents of rotatably operating processing [in / in drawing 10 / the image-operations equipment of drawing 1] is shown are a figure showing the example of the rotatably operating object image used for explanation of the algorithm of the rotatably operating processing in the image-operations equipment of drawing 1. In this explanation, the case where a picture is rotated 90 degrees in the counterclockwise direction is taken for an example.

[0039]While storing in the change-point-information storage 3b the color change point data in which the position of the color change point in each raster line of binary picture data is shown in the data format of Locations [Height] and [counter] in the rotatably operating of this embodiment, The color change point data after rotatably operating processing is stored in the change-point-information storage 3b in the data format of Result_Locations [Height1] and [counter1]. Here, in Result_Locations [Height1] and [counter1], parameter Height1 and counter1 were used in order to distinguish from the parameter of Locations [Height] and [counter]. In this rotatably operating, Locations [Height] and [array parameter Pointer[for raising the retrieval effectiveness to counter]] are used, The value of the parameter counter in each raster line denoted by Locations [Height] and [counter] is stored in this array parameter Pointer[].

[0040]For example, array parameter Pointer[] shown in drawing 10 (b) is set up to the color change point data of the picture before the rotation shown in drawing 10 (a). Parameter [as opposed to the parameter Height "0" of Locations [Height] and [counter] at this example of a graphic display] counter "0", parameter counter to the parameter Height "1" "3" -- as -- it being set as array parameter Pointer[], respectively, and, The raster line which does not store color change point data by this array parameter Pointer[] can be carried out the outside of a processing object beforehand, and the retrieval effectiveness to Locations [Height] and [counter] can be raised.

[0041]In this rotatably operating, rotating 90 degrees in the counterclockwise direction a picture, It is dividing a raster image into the raster line of the direction (lengthwise direction) which intersects perpendicularly with the raster line before rotation, and reconstructing color change point data, It is finding out the position of the color change point in the raster line of this lengthwise direction from Locations [Height] and [counter]. When rotating a picture 90 degrees in the counterclockwise direction, in after the information at the left end of [before rotation] a picture rotating, it becomes information pictures of a picture lower end. Since the left end of this picture is the starting point of color change point data, color change point data is generated towards an upper bed from the lower end of the picture after rotation.

[0042]Next, the general procedure of this rotatably operating is explained, referring to drawing 11.

[0043]First, if color change point data a is searched to the order of rows shown by Locations [Height] and [counter] to the Height and this color change point data a finds out, While Height which found out this color change point data a stores in Result_Locations [Height1] and [counter1] the value of Height which serves as an initial line of a run and serves as this initial line, The flag ChangeColor which shows the start of a run is set (processing sa1). For example, when rotating the raster image shown in drawing 11 (a) 90 degrees in the counterclockwise direction, it searches to

Locations [Height] and [counter] (shown in drawing 11 (b)) of this raster image, the direction, i.e., the lengthwise direction, of an arrow in a figure.
[0044]it is shown when changing-point-data a is found out (i of drawing 11 (c)) -- it is shown for performing search to the next Height (ii of drawing 11 (c)) -- if changing-point-data a is found out by this Height, search to the next Height will be performed further. Thus, if changing-point-data a is found out, search will be continued until it searches Height in which changing-point-data a does not exist, It is shown when Height in which changing-point-data a does not exist is found out (iii of drawing 11 (c)), The flag ChangeColor is canceled, while this Height judges that it is an end line of a run and stores the value of that Height in Result_Locations [Height1] and [counter1] (processing sa2). Before Height in which Height to changing-point-data a which found out changing-point-data a does not exist does not perform processing which stores the value of Height in Result_Locations [Height1] and [counter1].
[0045]Subsequently, it returns to processing sa1 again, and this processing sa1 and sa2 are repeated until the relation of Height=ImageHeight is materialized. Thus, by repeating processing, Result_Locations [Height1] which shows the picture after rotation, and [counter1] are obtained (shown in drawing 11 (d) and (e)).
[0046]Next, it explains, referring to drawing 8 and drawing 9 for the procedure of this rotatably operating concretely.
[0047]While initializing each of array parameter Pointer[] and parameter Height1 to 0 at Step S21 first with reference to drawing 8, initialization of Result_Locations [Height1] and [counter1] is performed. The value of ImageHeight (total number of a raster line) is assigned to initialization of this Result_Locations [Height1] and [counter1] Result_Locations [Height1] and [counter1=0].
[0048]In continuing Step S22, it is judged whether parameter Height1 is one or more. When parameter Height1 is one or more, it progresses to Step S23, and this processing is ended when parameter Height1 is not one or more.
[0049]In Step S23, one is set to the parameter Height, Locations [0] and [Pointer[0]] are substituted for Min_Location for the earliest head position of the color change point in the minimum, i.e., the raster line, of Height position of Locations [Height] and [counter] to be shown. If it judges whether the relation of Height<=ImageHeight is materialized in continuing Step S24 and the relation of Height<=ImageHeight is materialized, When it judges that an unsettled raster line exists, it progresses to Step S25 and the relation of Height<=ImageHeight is not materialized, it judges that an unsettled raster line does not exist, Step S26 and Step S27 are skipped, and it progresses to Step S28.
[0050]In Step S25, it is judged whether the relation between Min_Location>Locations [Height] and [Pointer[Height]] is materialized, If the relation between Min_Location>Locations [Height] and [Pointer[Height]] is materialized, It judges that still smaller Min_Location exists, and progresses to Step S26, Locations [Height] and [Pointer[Height]] are substituted for Min_Location, and the value of Min_Location is rewritten. If the relation between Min_Location>Locations [Height] and [Pointer [Height]] is not materialized, still smaller Min_Location will judge that it does not exist, will skip Step S26, and will follow it to Step S27. The parameter Height is incremented one time, the processing from Step S24 is repeated again, and the thing minimum in a Height position [of Locations [Height] and [Pointer[Height]]] raster line is searched with Step S27.
[0051]In Step S28, as shown in drawing 9, while performing initialization of the flag ChangeColor which shows that it is a color change point in parameter counter1 and 1, and the parameter Height, parameter Height1 is initialized. Initialization of parameter Height1 is performed based on the following (2) types.
[0052]
Height1 =Raster_SIZE-Min_Location-1 -- (2)
Here, Raster_SIZE shows the total dot number to the direction of the raster line of a raster image, and Min_Location is the minimum searched by processing from the above-mentioned step S24 to

S27.
[0053]In continuing Step S29, if it judges whether the relation of Height<=ImageHeight is materialized and the relation of Height<=ImageHeight is materialized, it will progress to Step S30. If the relation of Height<=ImageHeight is not materialized, it will progress to Step S38 mentioned later.

[0054]In Step S30, it is judged whether the relation between Min_Location=Locations [Height] and [Pointer[Height]] is materialized, If the relation between Min_Location=Locations [Height] and [Pointer[Height]] is materialized, If it judges that it is a color change point, it progresses to Step S31 and the relation between Min_Location=Locations [Height] and [Pointer[Height]] is not materialized, it will progress to Step S34 which is judged not to be a color change point and is mentioned later.
[0055]If it judges whether the flag ChangeColor is 1 in Step S31 and the flag ChangeColor is not 1, If the position of the color change point in a concerned Height position raster line judges that it is a starting position of the color change point to the direction which intersects perpendicularly with this raster line, and progresses to Step S32 and the flag ChangeColor is 1, The position of the color change point in a concerned Height position raster line judges that it is a position of the color change point following a front Height position raster line, skips Step S32, and progresses to Step S33.
[0056]In Step S32, while assigning the value of the parameter Height concerned to Result_Locations [Height1] and [counter1], Parameter counter1 is incremented one and array parameter Pointer [Height] is incremented one time at continuing Step S33. Subsequently, it progresses to Step S37 mentioned later.
[0057]When judged with the relation between Min_Location=Locations [Height] and [Pointer[Height]] not being materialized in Step S30, The flag ChangeColor is 1 at Step S34, and it is judged whether the relation of Height<ImageHeight is materialized, It judges that the flag ChangeColor will be 1, and the position in a concerned Height position raster line will be end position of a color change point if the relation of Height<ImageHeight is materialized, and progresses to Step S35. On the other hand, the flag ChangeColor is 1, and if the relation of Height<ImageHeight is not materialized, Step S35 will be skipped and it will progress to Step S36.
[0058]In Step S35, while assigning the value of the parameter Height concerned to Result_Locations [Height1] and [counter1], Parameter counter1 is incremented one, and at continuing Step S36, zero is set to the flag ChangeColor and it progresses to the above-mentioned step S37.
[0059]In Step S37, the parameter Height is incremented one time and it returns to Step S29 again, and the processing from this step S29 is repeated until the relation of Height=ImageHeight is materialized.
[0060]If the relation of Height<=ImageHeight is not materialized in Step S29, ImageHeight will be substituted for Step S38 Result_Locations [Height1] and [counter1], and it will return to Step S22 again.
[0061]Result_Locations [Height1] which expresses the picture after rotation with color change point data, and [counter1] are obtained by repetition of this processing. For example, the color change point data of the picture after the rotation shown in drawing 10 (c) is obtained by performing above-mentioned processing to the color change point data of the picture before the rotation shown in drawing 10 (a).
[0062]Thus, Result_Locations [Height] showing the result of the obtained image-operations processing and [counter] (or Result_Locations [Height1], [counter1]), It is given to the output-data-form conversion method 4 once it is stored in the color change point information storing part 3b, The output-data-form conversion method 4 the result of image-operations processing. Result_Locations [Height] to express and [counter] (or Result_Locations [Height1], [counter1]) are changed into the data of the data format which the output device 5 requires, and it outputs to the output device 5.
[0063]It changes into the color change point data in which the position of a color change point [in /

for the incorporated binary picture data / each of that raster line] is shown by this embodiment by the above, Since this color change point data is stored in the color change point information storing part 3b in the data format of Locations [Height] and [counter], When incorporating the binary picture data used as an image-operations object, the storing capacity of the color change point information storing part 3b which storing of this binary picture data takes can be reduced. Since image-operations processing of expansion, reduction, rotation, etc. is performed to the color change point data stored in the color change point information storing part 3b, in the image-operations processing which needs the data movement of the conventional bitwise, the processing can be performed by math processing, and improvement in the speed of image-operations processing can be attained.
[0064]When dealing with a picture with high resolution, according to this resolution becoming high, binary picture data volume (the amount of bit image data) increases by the order of a square, but. Since it changes into the color change point data in which the position of a color change point [in / for the incorporated binary picture data / each of that raster line] is shown and stores in the color change point information storing part 3b, While being able to prevent much increase of the capacity of the required color change point information storing part 3b resulting from increase of this data volume, Since image-operations processing is performed to the color change point data stored in the color change point information storing part 3b, much increase of the throughput resulting from increase of data volume can be prevented.
[0065]Furthermore, The result of image-operations processing by the output-data-form conversion method 4. Since Result_Locations [Height] to express and [counter] (or Result_Locations [Height1], [counter1]) are changed into the data of the data format which the output device 5 requires and it outputs to the output device 5, It is possible to obtain easily the output of the data of the data format which the output device 5 requires.
[0066]If the binary picture data used as an image-operations object is used as alphabetic data from the written data from a handwriting input device, or a character input device, By combining this equipment as a handwriting input device or a character input device, While the storing capacity of the color change point information storing part 3b which storing of the binary picture data used as an image-operations object takes is reducible, it becomes possible to build the information input device which has the effect that improvement in the speed of image-operations processing can be attained, an information recognition processing unit, etc.
[0067](The 2nd form of enforcement) The principle of variable power processing including an above-mentioned expansion and reduction is applicable to the data compression of G3 facsimile equipment. Usually, although the position of the color change point on a raster line is developed to a bit image in G3 facsimile equipment using the method of compressing the position of the color change point on a raster line by one dimension and two-dimensional coding at the time of extension of this compressed data, The position of the color change point on a raster line is held as it is, and it elongates based on the principle of variable power processing including an above-mentioned expansion and reduction. Thus, it is possible to apply the principle of variable power processing including the expansion in this invention and reduction to the data compression of G3 facsimile equipment.
[0068]
[Effect of the Invention]The data conversion means changed into the color change point data in which the position of a color change point [in / for the incorporated binary picture data / each of that raster line] is shown according to the image-operations equipment according to claim 1 as explained above, Establish the storing means which stores color change point data, and color change point data is read from a storing means, while being able to reduce the storing capacity which storing of this binary picture data takes when incorporating the binary picture data used as an image-operations object since image-operations processing is performed to this color change point data that carried out reading appearance, improvement in the speed of image-operations processing can be attained.

[0069]According to the image-operations equipment according to claim 2, since the data format conversion means which changes into data the color change point data processed by image-operations processing according to the data format of the output destination change was established, the data according to an output destination change can be obtained easily.
[0070]The process changed into the color change point data in which the position of a color change point [in / for the incorporated binary picture data / each of that raster line] is shown according to the image-operations method according to claim 3, Color change point data is read from the process of storing color change point data in a storing means, and a storing means, while being able to reduce the storing capacity which storing of this binary picture data takes when incorporating the binary picture data used as an image-operations object since the process of performing image-operations processing to this color change point data that carried out reading appearance is included, improvement in the speed of image-operations processing can be attained.
[0071]According to the image-operations method according to claim 4, since the process of changing into the data according to the data format of the output destination change the color change point data processed by image-operations processing is included, the data according to an output destination change can be obtained easily.

[Translation done.]